No. XV.

SELF-ACTING FEEDING APPARATUS FOR HIGH-PRESSURE BOILERS.

The SILVER MEDAL *was presented to Mr.* CHARLES GRAFTON, *of No.* 1 *Dover Street, Chorlton-on-Medlock, for his plan of a Self-Acting Feeding Apparatus for High-Pressure Boilers.*

1 *Manchester Terrace, Millwall, Poplar,*
SIR, *January* 6, 1843.

I DO not know whether I am laying myself open to the charge of presumption in laying the accompanying documents before you, but as I know you have before bestowed your patronage upon inventions whose object was of a similar nature, I have ventured, although a stranger to your regulations, to bring them under your notice. Hoping that my suggestion may be deemed worthy of notice by the Society whose interests you represent,

I remain, Sir, &c. &c.

To FRANCIS WHISHAW, *Esq.* C. GRAFTON.
Secretary, &c. &c.

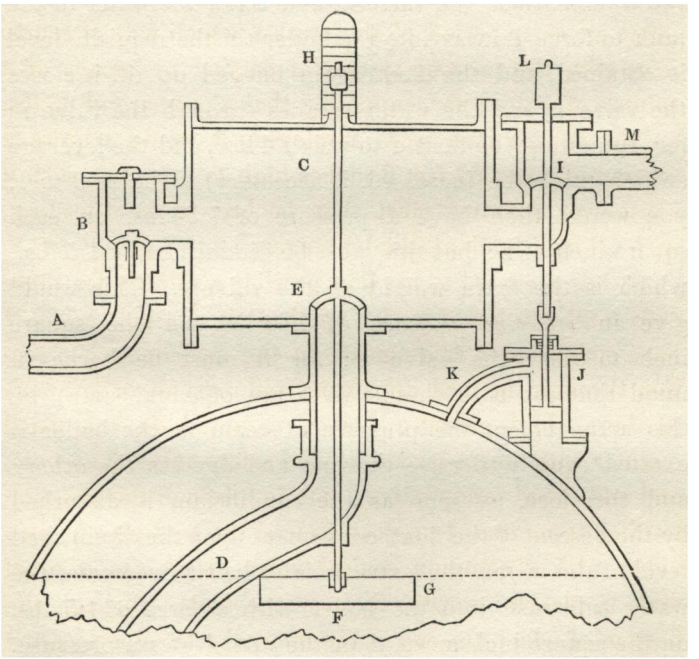
IT is, I believe, an acknowledged fact, that the absence of any practical self-acting feeding apparatus for boilers in which high-pressure steam is employed is a deficiency of a most serious nature. The deplorable consequences which may ensue from the neglect of those who have the care of such boilers, in keeping up the requisite supply of water (a neglect which I believe to have been the cause of three out of five of the steam-boiler explosions which have as yet taken place), the wasteful expenditure of fuel, and deterioration of the boiler, which must arise

from irregular feeding, when the due level is not maintained equally during the period of working, are consequences of this deficiency so obvious as scarcely to need a comment.

It is now a principle recognised by the highest authorities, that the most economical engine is that in which the expansive property of steam is put forth to its fullest extent, by employing high-pressure steam in one of the ordinary condensing construction, and cutting it off at an early period of the stroke, which will of course neutralise the present system of feeding by means of a column of water; for, supposing that a pressure of 35 lbs. on the square inch were employed, it would require a column of water 87 feet 6 inches high to overcome such a resistance; recourse must then be had to hand-feeding, with all its attendant disadvantages.

It has occurred to me that possibly a remedy for these evils might be found in the application of a plan which I have endeavoured to delineate in the accompanying section through the feed apparatus and part of an ordinary ten-horse high-pressure boiler, mounted in the usual manner with steam-nozzle, loaded safety-valve, man-hole, and additional safety-valve; but in place of the common feeding apparatus, I propose to lead the feed-pipe A, provided with a common conical valve at B, into a small tank C, placed immediately over the boiler, through the bottom of which the end of the internal feed-pipe D, fitted with a rising valve E, is introduced; the spindle of this valve is brought down, and passing through a small stuffing-box, is attached to a lever at F, which is loaded by means of a float G, buoyed up by the water in the boiler; a slight brass wire tapped into the stalk of the valve E, and passing through the top of the tank, shews, by means of an index-plate H, the position of the valve.

On the opposite side of the tank I would place another valve I, the spindle of which would be attached to the rod of a small piston working in a cylinder J, open at bottom, and of equal area to the valve I, the top side of which is exposed to the steam-pressure of the boiler by means of a pipe K. This valve is also loaded with a slight weight L, and the water, after passing through it, escapes through the overflow-pipe M.



The action of this apparatus may be explained in the following manner: Supposing the boiler at work with a pressure of 40 lbs. on the square inch, I propose that the weight L should exert a pressure of 1½ lbs. on each square inch of the valve I, which would be (supposing the valve to be 2½ inches diameter) 7·362 lbs. on the whole, which, together with the pressure communicated by means of

the pipe K from the boiler to the piston of the cylinder J, would give a total load of 41·5 lbs. on each square inch of the valve I. This pressure would soon be exerted by the force-pump of the engine; but when the water in the tank C attained more than this pressure, the valve I would rise, and allow the water to escape down the overflow-pipe M. But supposing the level of the water to be lowered, the float G will descend with it, and, aided by the lever F, raise the valve E, and allow the water in the tank to force its way into the boiler till the requisite level is obtained, and the float again buoyed up till it closes the valve E, and the water escapes through the valve I; for, supposing the float G to weigh 4 lbs., and the leverage (which might be increased, if necessary) to be as 9 to 1, you would then have a pressure of 7·33 lbs. on each square inch of E; but this must be diminished by 1·5 lbs., which is the extra weight on the valve I. This would give an *effective* pressure of 5·83 lbs. on the square inch to raise the valve E; for it must be borne in mind that (as both these valves are of equal area) by this arrangement the pressure of steam in the boiler is exerted equally to raise the one and depress the other; and therefore, as soon as the equilibrium is disturbed by the descent of the float, consequent upon the diminished level of the water, the extra weight being overcome, the water will rush into the boiler with a force of 1·5 lbs. on the square inch more than the actual steam pressure. This is supposing the water to fall entirely below the bottom of the float G, but it is obvious that it would, even with the leverage and adjustment I have given it, not require to fall more than an inch and a half before the valve would be raised, and by a judicious adjustment of the leverage, still greater nicety might be attained. (A small wire might be attached to the float and rise through

the boiler, to close the valve E, by hand if necessary.) It is upon the fact of the pressure upon both the valves E and I being constant, that I rely for success; for all the other schemes of whose existence I am aware have this defect, that the pressure from the boiler is variable, while the pressure from without is fixed; and even in boilers working with common low-pressure steam, that which is technically termed "boiling over," is often noticed when the steam becomes suddenly of a higher pressure than the feed-pipes were calculated to overcome, and the safety-valve is neglected. I have brought this proposition forward as applied to high-pressure boilers, but I am inclined to think that it might be applied with economy, as far as regards the prime cost, even in cases where the Jack-head system is effective, as the cost of the extra valves and tank would certainly not be more than that of the great amount of piping required under the above-named system; and the inconvenience to which their height and position expose them, and the absolute necessity which must exist, whenever the pressure is increased, of adding to that height, would be done away with.

No. XVI.

FLOATING BREAKWATER.

The SILVER MEDAL *was presented to Major* PARLBY, *No. 7 Allée d'Antin, Paris, for his plan of forming a Floating Breakwater.*

7 *Allée d'Antin, Champs Elysées, Paris,*
7 *February*, 1843.

THE principle upon which this breakwater is founded is derived from the natural effects from certain causes